Trip Report to the Denali Commission

Larsen Bay, Alaska

August 28, 2012

1. Participants

Team members were Jason Norris (CEPOA-PM-C-PL) and Nathan Epps (CEPOA-EN-G-HH).

2. Trip Purpose

The team traveled to Larsen Bay, Alaska on April 30, 2012, to conduct a site visit to assess the feasibility of constructing an offshore fuel terminal and to verify the project scope with community leaders. While in Larsen Bay, the team met with Mayor James Johnson and was accompanied to the project site by Councilman Bill Nelson.

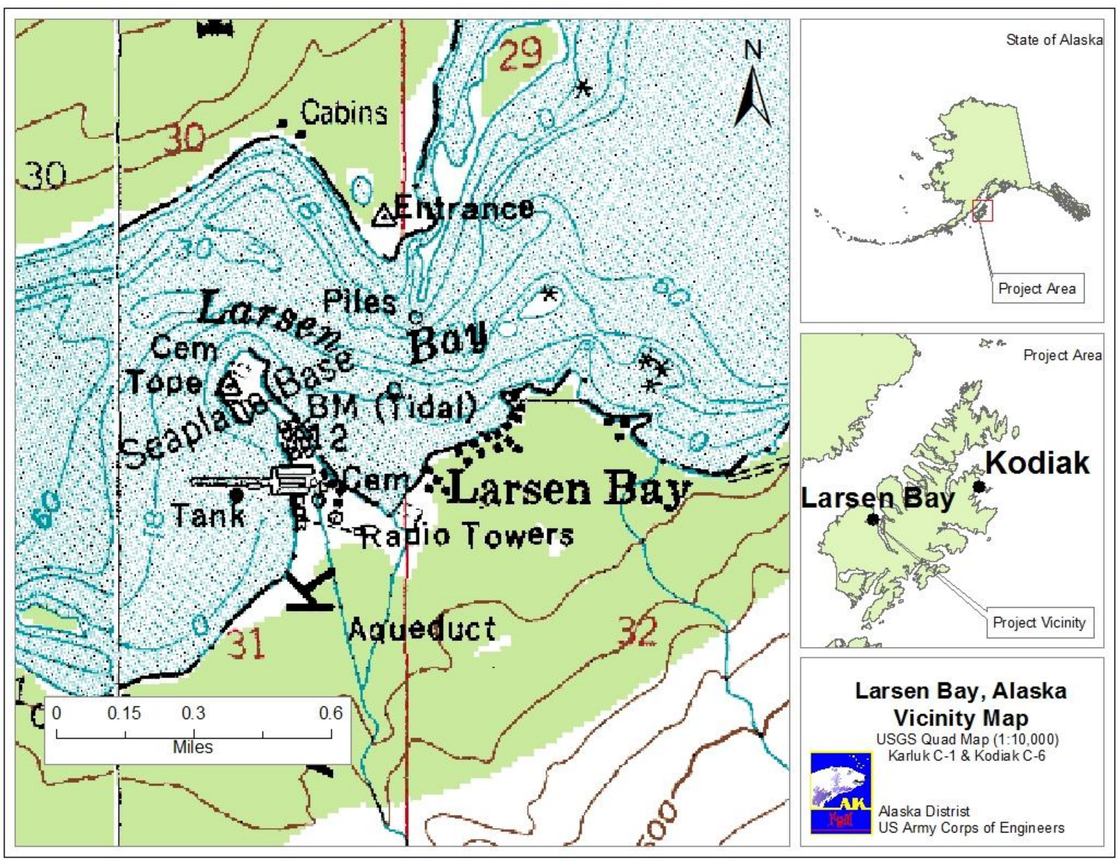

Figure 1. Location of Larsen Bay

3. Community Description

Larsen Bay is a community of 89 people on the western side of Kodiak Island, 60 miles west-southwest of Kodiak, and 290 miles southwest of Anchorage (Figure 1).

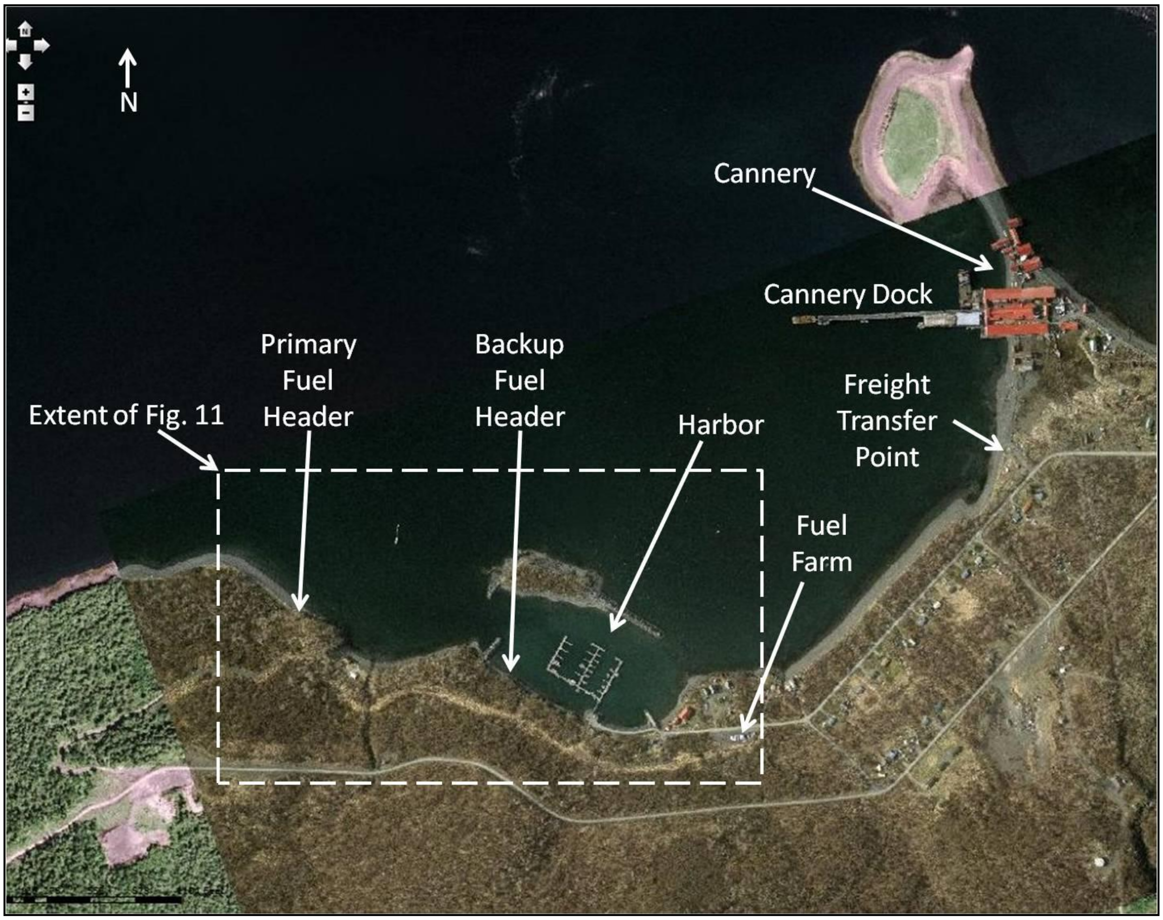

Figure 2. Aerial View of Larsen Bay
Source: Kodiak Island Borough with USACE amendments

The community's most prominent employer is the Icicle Seafoods Cannery located north of town. During the summer the cannery employs up to 300 people. The cannery owns a 1,000-foot-long timber dock, which is used strictly for moving cannery supplies and products. The community has a harbor that was constructed by the U.S. Army Corps of Engineers in 1999[1]. The harbor provides protected moorage for vessels with drafts up to 10 feet. Non-cannery freight is delivered by the landing craft M/V Lazy Bay and is usually unloaded on a protected beach south of the cannery (Figure 3). The uplands afford sufficient staging area for the community's needs, and the upper beach is firm enough to allow for roll off operations without major difficulty. The harbor's boat ramp sometimes acts as a secondary freight transfer point.

[1] http://www.poa.usace.army.mil/CO/CoOrg/PnI_New/p&ione_2007.html#Lar

Figure 3. Freight Transfer Beach

The Denali Commission and the Alaska Energy Authority constructed a bulk fuel facility in 2005 (Project 340140 in the Denali Commission Project Database System) with a gross storage capacity of 128,000 gallons (Figure 4). The facility is connected to two fuel headers via aboveground pipelines consisting of 8-inch schedule 80 steel pipes (Figure 5).

The primary fuel header is approximately 1,000 feet west of the small boat harbor's southwest breakwater (Figure 2). An alternate fuel header is located at the west end of the harbor. The alternate header has only been used once since construction due to depth and turning limitations inside the harbor.

Larsen Bay generally schedules one fuel delivery per year but supplements this delivery by buying down the cannery's reserves at the end of the fishing season. Doing this usually allows the community to get through the winter. However, in a particularly cold winter, the community may require an earlier fuel delivery than normal.

Figure 4. Current Fuel Farm

Figure 5. Fuel Pipelines

4. Pre-Visit Investigation

Prior to visiting the community, the team spoke with the following people:

1. Mayor James Johnson, City of Larsen Bay
2. Councilman Bill Nelson, City of Larsen Bay
3. Jim Beckham, V.P. Operations, Petro Marine
4. Bob Cox, General Manager, Crowley Marine
5. Sharm Setterquist, Port Captain, Crowley Marine

Based on conversations with the listed local officials and fuel shippers, it was determined that the scope of this project should focus solely on a solution that would better facilitate fuel deliveries to Larsen Bay. At the time of the bulk fuel storage upgrade, multiple fuel shippers requested that mooring dolphins be installed to facilitate deliveries. However, funding for that project was solely through the Denali Commission's Bulk Fuel System Upgrade program. Because of this limitation, additional mooring facilities (considered a transportation feature to be funded through the Denali Commission's Transportation Program) could not be included at that time.

Mr. Beckham of Petro Marine indicated that a dock is not needed and that mooring dolphins with a catwalk/trestle system could suffice. He also said that Larsen Bay is "fjord-like" and therefore the dolphins could be located relatively close to shore while still allowing their barges, which draft 25 feet, to make deliveries. The bathymetric information was verified by examining published National Oceanographic Survey data of Larsen Bay. During this conversation Mr. Beckham stated that Petro Marine could not commit to future deliveries to the city of Larsen Bay, even if mooring improvements were constructed.

Mr. Cox of Crowley stated that Crowley asked for these improvements at the time the bulk fuel facility upgrade was constructed. Crowley is currently the only provider that will deliver fuel to the city's facility because they are willing to anchor offshore and float hose to the fuel header. The amount of hose required depends on tidal fluctuations but is approximately 700 feet (Figure 6).

Figure 6. Crowley Delivering Fuel to Larsen Bay, October 2008
Source: Crowley Marine

Councilman Nelson said that on the most recent delivery, Larsen Bay paid $4.87 per gallon for #2 diesel and $4.90 per gallon for gasoline which translates to a retail price of $5.57 per gallon for #2 diesel and $6.11 per gallon for gasoline. Mayor Johnson said the city pays a hose pull surcharge due to the lack of mooring facilities for fuel providers. Sharm Setterquist of Crowley confirmed that after the first 200 feet of hose, customers are charged $3.50 per foot of hose each 50 feet (hoses are in 50 foot sections). At 700 feet of hose pulled, this surcharge totals $1,750 per delivery. Both Mayor Johnson and Councilman Nelson stated that one goal of the project is to allow the city to avoid these surcharges.

Mayor Johnson stated that another goal of the improvements is to allow other providers to deliver to the city's header. In addition to the fee associated with floating hose to shore, other providers have a lower minimum delivery amount than Crowley's 50,000 gallon minimum. Dealing with these providers would allow the city more flexibility in its purchases.

Freight considerations were briefly investigated as well. To address these concerns, other project alternatives were evaluated including a concrete dock on steel piles and a sheet pile bulkhead connected to the shore by an earthen causeway. These facilities would have the added benefit of allowing cargo transfer at the site, but the cost of improving site access to allow for freight deliveries was considered prohibitive based on the road improvements needed to allow heavy vehicles to access the site. Also, it was unclear if unloading freight at this site would provide any advantage to the city over their current site near the cannery. Because of these conditions, improved freight movement was eliminated as a project goal.

5. Site Conditions

The primary fuel header is accessible from the community road network by a half mile of single lane pioneer road with prolonged grades exceeding 20 percent (Figure 7). The road is made of local material and has a soft driving surface that becomes muddy in wet conditions.

Figure 7. Trail Leading to Primary Fuel Header

Figure 8. Beach and Proposed Trestle Location (left). Fuel Header from Beach Below (right)

The proposed project site is located to the west of the harbor on a gravel beach (Figure 8, left). The fuel header is about 10 feet above this beach at the edge of a rock outcrop (Figure 8, right). The beach is in a sheltered location; however, the mooring site will be in waters exposed to west winds blowing across Larsen Bay and the waves generated by these winds. The depth to bedrock at the proposed project location is unknown. Bedrock is visible under the fuel header and to the west of the site on the beach (Figure 9).

The depth to bedrock at all pile driving locations should be determined prior to driving piles at this site. The presence of shallow bedrock (less than 30 feet below the bottom of the bay) would require drilling and socketing the piles into the rock.

A 90-foot long elevated catwalk between the trestle and header would facilitate ship to shore movement. A catwalk would also protect the pipeline from damage. Catwalks of this type have been successfully used in similar situations in other parts of Alaska (Figure 10).

Figure 9. Rock Outcrop on the Beach Near the Project Site

6. Follow-up Investigations

After the site visit, the team followed up with Mr. Sharm Setterquist, Port Captain, Crowley Marine and Mr. Jamie Flores, Kodiak Plant Manager, Petro Marine to further define mooring requirements for the segment of their fleets that either currently or could deliver fuel to Larsen Bay. The Petro Marine vessel is a chartered barge that currently delivers fuel to the cannery. This barge is 350 feet in length with a 20 foot loaded draft. At this point Petro Marine stated that they do not have plans to deliver fuel to the city's fuel header even if mooring facilities are constructed. Therefore, mooring needs for this vessel were not taken into consideration. Crowley's Kodiak fleet consists of a 165-foot barge and a 180-foot barge with loaded drafts of 7 feet, 2 inches and 12 feet, 3 inches, respectively. Given the fleet's dimensions, the optimal mooring configuration is four dolphins spaced evenly at 54 feet apart.

It was also noted during these follow-up conversations that this facility could be designed to both accept and dispense fuel, providing a service to fishing vessels in the area as well as a revenue stream to the city. The demand for this service was not researched during the trip as it was outside of the defined scope.

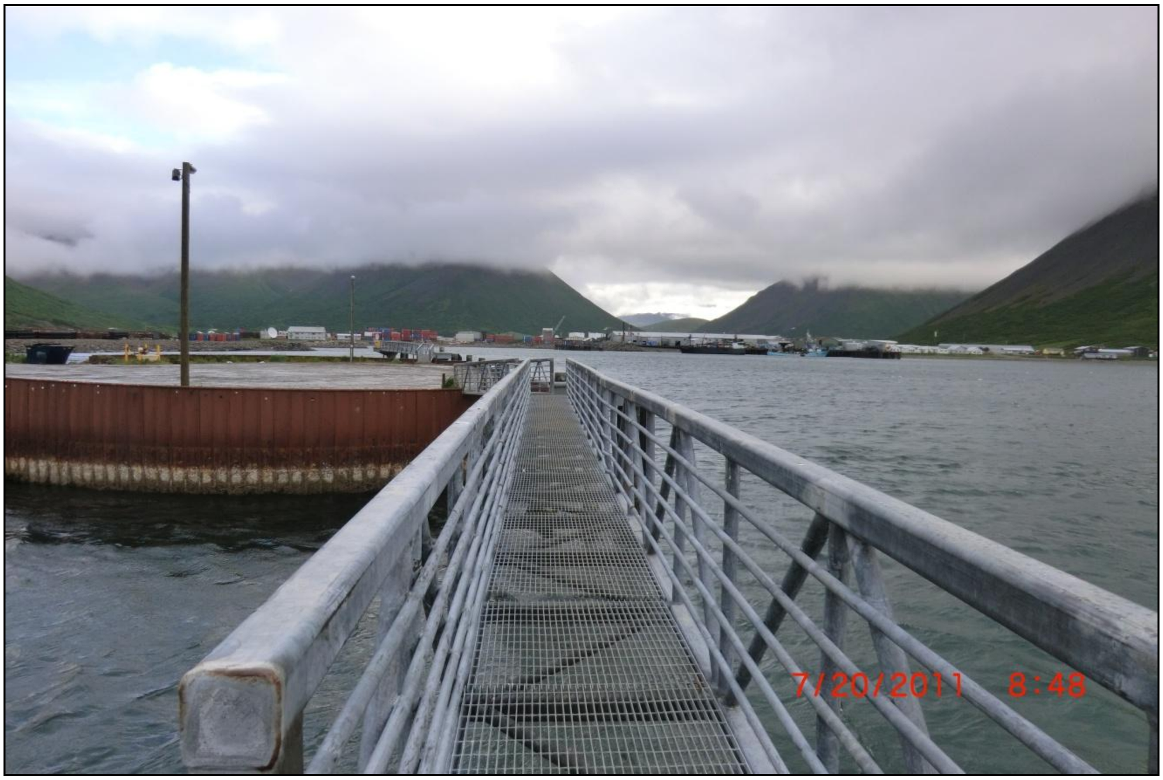

Figure 10. Example of a steel catwalk connecting a mooring dolphin to a dock at King Cove, AK (Catwalks on the trestle at Larsen Bay would be similar.)

7. Conclusions and Recommendations

Larsen Bay would benefit from a petroleum mooring berth to facilitate transfer of fuel from delivery vessels to the bulk storage tanks. The selected site for this terminal would be at the beach near the existing primary marine fuel header. Information gathered during the pre and post-visit investigations coupled with information gained during the site visit led the team to determine that only one feasible alternative exists for facilitating fuel transfers at Larsen Bay. The recommended project is to construct a dolphin line with related trestle system.

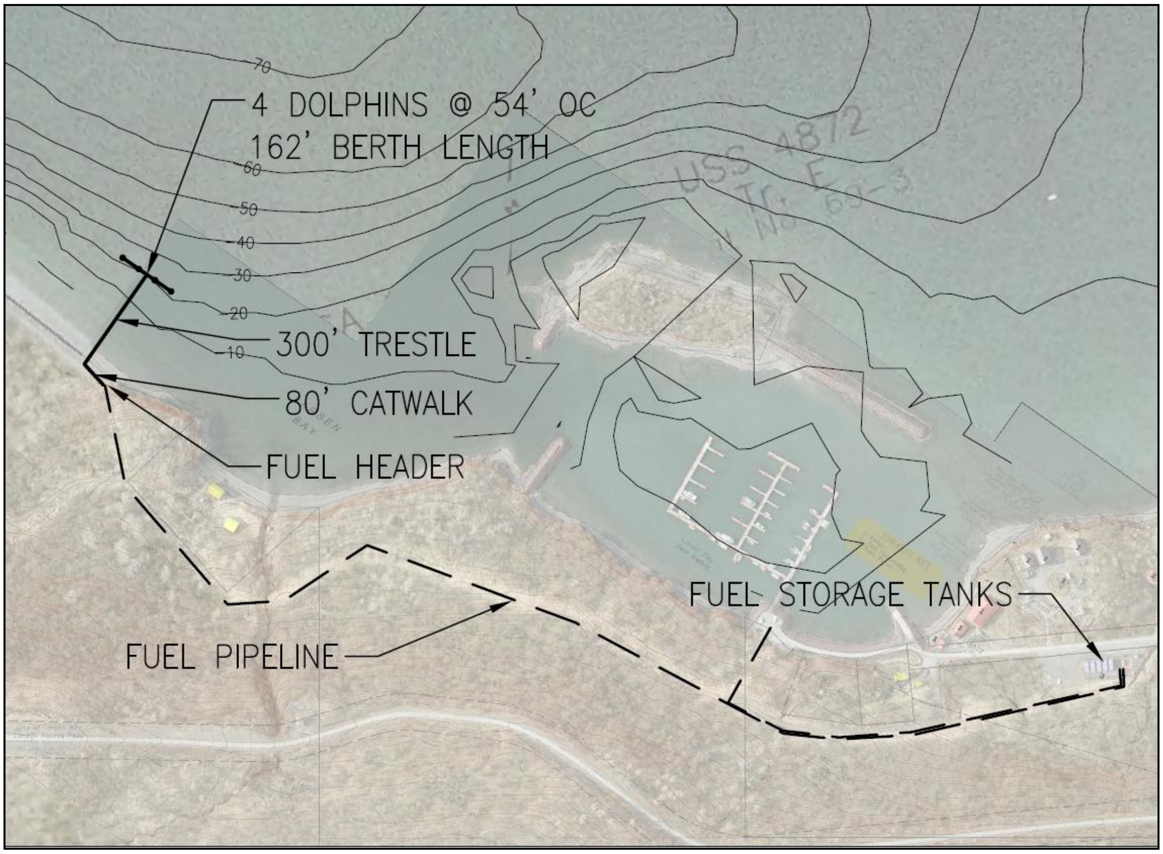

Figure 11. Proposed Fuel Trestle and Mooring Dolphins

The mooring dolphins would be connected to each other and the shore by a steel pedestrian trestle. This system would be an efficient solution to existing problems at Larsen Bay and is similar to the facility requested by the fuel shippers during the bulk fuel upgrade project. Specifically, the project would construct a line of mooring dolphins approximately 300 feet offshore at -20 feet Mean Lower Low Water (MLLW) and extend the existing pipeline to the mooring face. This project would provide full tide moorage for the current fuel delivery fleet. The exact configuration of the dolphins would need to be coordinated with the barge operators if the project moves forward. A bathymetric survey and geotechnical investigation of the site are required in order to design this facility.

7. Proposed Project Scope

Since there is only one feasible alternative at this site, a rough order of magnitude estimate of the cost to design and construct the project was created. The construction estimate is based on the cost to execute similar work in the recent past rather than on a project designed for this site. Should this project be pursued, a more accurate cost would be estimated during the design phase which would more accurately reflect this specific project. A site survey, geotechnical report and a preliminary design are needed to make a working cost estimate of this project. Table 1 shows the rough order of magnitude cost estimate for this project. These costs are based on the assumption that local overburden is insufficient for installation of driven piles and reflect the need for drilled and socketed piles. If the geotechnical report finds that there is sufficient overburden for driving piles, the estimate could change.

Table 1: Rough Order of Magnitude Total Project Cost Estimate

Item	Sub-Item	Unit	Quantity	Cost per Unit	Subtotal	Total
Geotechnical Report		LS	1	$ 225,000		$ 225,000
Site Survey		LS	1	$ 50,000		$ 50,000
Engineering Design		LS	1	$ 225,000		$ 225,000
Contract Administration		LS	1	$ 150,000		$ 150,000
Construction Administration		LS	1	$ 150,000		$ 150,000
Construction Cost	Mob/Demob	LS	1	$ 500,000	$ 500,000	
	Drilled & Socketed 16-inch Galvanized Steel Piles	EA	14	$ 50,000	$ 700,000	
	500-lb. Zinc Anodes	EA	70	$ 1,000	$ 70,000	
	Helical 6-inch Galvanized Steel Piles	LF	1,000	$ 50	$ 50,000	
	Bar Grate Catwalk	SF	2,000	$ 30	$ 60,000	
	8-inch Galvanized Steel Pipeline	LF	1,000	$ 350	$ 350,000	
	Fuel Header	EA	2	$ 10,000	$ 20,000	
	Contingency	LS	1	20%	$ 350,000	
	Construction Cost Subtotal:					$ 2,100,000
Total Project Estimate:						**$ 2,900,000**